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SUGGESTIONS ON GROWING EGYPTIAN COTTON, IN THE SOUTHWEST.

INTRODUCTION.

Experiments with Egyptian cotton have been carried on during the past nine years in the southwestern United States. The results have been sufficiently good to justify the recommendation that it now be tried on a commercial scale by farmers in the irrigated sections of southern Arizona and southeastern California. It should be definitely understood that Egyptian cotton is not a high-priced speculative crop like many orchard fruits and truck crops. It is to be classed as a staple crop like grain and alfalfa, instead of being a perishable crop like citrus fruits, cantaloupes, or garden truck.

Under favorable conditions and with good care it is to be expected that Egyptian cotton will yield from 1,500 to 2,000 pounds of seed cotton per acre. At the usual rate of about 28 pounds of fiber from 100 pounds of seed cotton, a yield of 1,800 pounds per acre would produce a 500-pound bale of fiber and 1,300 pounds of seed.

Egyptian cotton is a special type. Its production on a large scale is at present confined to Egypt, where, during the last 12 or 13 years, the average total crop has been approximately 600,000,000 pounds, or about 1,200,000 American bales. Of this quantity an average of about 55,000,000 pounds has been exported to the United States.

Table I gives the lowest and the highest prices quoted for Egyptian cotton during each month of the past two years on the Boston market and, for purposes of comparison, the prices of American upland cotton (middling) at Savannah.

TABLE 1.—*Monthly range of prices, in cents per pound, quoted at Boston for Egyptian cotton and at Savannah for Middling Upland cotton from November, 1909, to October, 1911.¹*

Year.	Month.	Egyptian cotton prices.		Upland cotton prices.	
		Low.	High.	Low.	High.
1909	November	19	27½	13½	14½
	December	22½	31	14½	15½
	January	24	32½	14½	15½
	February	22	35½	14½	15½
	March	22½	36½	14½	14½
	April	20	36½	14½	14½
	May	19½	33	14½	15½
	June	17½	33	14½	14½
	July	17½	24½	14½	15½
	August	18½	24½	14½	15½
	September	17½	25	13½	14½
	October	17½	27	13½	14½
1910	November	17½	26	13½	14½
	December	16½	25½	14½	14½
	January	18	25	14½	14½
	February	16½	23½	14½	14½
	March	16	22½	14½	14½
	April	16½	24	14½	15½
	May	17½	25	15½	15½
	June	2 16½	3 25½	15½	15½
	July	2 15½	3 24½	13½	15½
	August	2 16	3 24½	11½	13½
	September	2 15½	3 24½	10½	12½
	October	2 14½	3 23½	8½	9½

¹ The figures for Egyptian cotton are taken from the weekly quotations in the Commercial Bulletin published at Boston, which is the leading American import market for this type of cotton. The figures for Middling Upland are taken from the Commercial and Financial Chronicle, of New York. Prices at Savannah are here given for the reason that this is one of the least speculative of the larger American cotton markets.

² New-crop prices.

³ Old-crop prices.

In connection with the experiments in growing Egyptian cotton in the Southwest, the crops from some of the cooperative fields were sold on bids in the eastern market. Of the crop of 1909, 15 bales were sold in March, 1910, at 31 cents per pound f. o. b. New York. Of the crop of 1910, 13 bales were sold in April, 1911, at 28 cents per pound. The manufacturer who purchased the crop of 1909 gave it as thorough a test as could be given so small a lot and reported that it compared very favorably with the best grades of cotton produced in Egypt. While it is quite impossible to predict the future course of cotton prices, it seems reasonable to expect that the high-grade Egyptian cotton, either imported or American grown, should be worth from 20 to 30 cents per pound under normal market conditions.

From the figures given in Table I it will be seen that a gross return of \$80 to \$150 per acre may be expected if the conditions are favorable and the crop is given the proper attention. The cost of production to be offset against this estimate of yield will vary greatly with the conditions and the methods employed. The largest item of expense is the cost of picking the crop, which is more than with Upland cotton. On the other hand, the greater value of the

product of the Egyptian type of cotton permits larger returns to be obtained. It is believed that the most satisfactory and profitable returns will be obtained where small acreages are planted by each family, so that the picking may be done without employing extra labor.

While it is fully believed that Egyptian cotton can be made a profitable crop in the irrigated Southwest, it is strongly urged that prospective growers do not put in a very large acreage the first season, because the crop has certain cultural peculiarities that are best learned by experience, and also because the difficulty of employing the necessary labor for picking is likely to be underestimated by inexperienced growers.

Since Egyptian cotton has thus far been grown in the United States on a very limited scale, only general suggestions can be offered as to methods of handling the crop. It is not expected that these suggestions will be fully applicable to all sections of the Southwest, and in presenting them, particularly in so far as they apply to cultural matters, the aim is to indicate the requirements of the plant rather than to give detailed instructions as to planting, irrigation, and cultivation.

Everyone who contemplates growing Egyptian cotton should keep in mind that the crop must be picked, ginned, baled, and shipped to an eastern market before it can be sold. The ginning and baling require special machinery, the cost of which is beyond the resources of most individual farmers. In order to meet this need it will be advisable for each community where the crop is to be grown to organize in advance a cotton-growing association. Such an association can also be made a useful agency for selling the crop when it is ready for market.

SEED FOR PLANTING IN 1912.

Seed of a select, acclimatized variety of Egyptian cotton sufficient for planting several hundred acres is now available for distribution. This seed has been increased from an exceptionally good individual plant, grown in 1907, and has been named the "Yuma" variety. The increase fields during the past three years have been carefully examined and all "off-type" or otherwise undesirable plants have been removed early enough to prevent crossing. During the past season there were so few pronounced variations in the increase fields that the present supply of seed may be expected to give a very uniform and high-grade product, provided it is planted on suitable soil and the crop is properly handled. The Yuma variety, although developed from the Egyptian Mit Afifi, is in many respects very different from the latter. It has much larger bolls and longer, silkier, and lighter colored fiber.

It is strongly recommended that only acclimatized seed be planted, since repeated tests of seed newly imported from Egypt have given unsatisfactory results both in yield and quality of the fiber. Only such seed as has resulted from several years of acclimatization and selection in the Southwest can be counted upon for successful crop production. Much of the seed obtained from Egypt is contaminated with the so-called Hindi cotton, which is very inferior in quality and which interbreeds readily with the improved Egyptian varieties and spreads deterioration.

It is very important in starting cotton production in a new region to avoid the introduction of inferior varieties. And it is even more important to avoid the introduction of noxious insects, such as the boll weevil. The isolation of the irrigated sections of the Southwest makes effective quarantine measures easy to apply, and it is much to be hoped that these isolated communities will exercise every precaution to keep out the boll weevil and other similar pests.

SELECTION OF THE LAND.

Wherever possible the first crop of Egyptian cotton should be put on land that has already been in crop. On new desert land the growth is usually very uneven, and there will be a corresponding variation in the quality of fiber produced. Uniformity of fiber is one of the main requisites in this type of cotton. Land that has produced one or more crops of grain, sorghum, or alfalfa should do well in cotton. If there are root-rot spots in an alfalfa field, they are likely to appear in a following crop of cotton. For that reason, and also because it is hard to get alfalfa sod into good tilth quickly, it is better to put the first crop of cotton on land that has been in grain or some similar field crop rather than to put it on new land or poorly prepared alfalfa land.

Very sandy land, too light to hold sufficient moisture, is not well adapted to cotton, but in some localities cotton has done well in a fine sandy soil. While very heavy soils are much more difficult to get into good condition for cotton than the lighter soils, yet, if the equipment is available to get the heavy land into good tilth and keep it in good condition throughout the season, a good crop should be made. In heavy soils it is especially important to get the land level and in good condition in the spring and then water it evenly and keep it well cultivated throughout the season. One of the most important points to keep in mind is that cotton will not yield well and the fiber will be uneven and weak if the plants during the growing season are repeatedly subjected to alternations of very dry and very wet soil conditions. For that reason the ditches should not be far apart and the borders or checks should not be too long.

PREPARATION OF THE LAND.

Land that is to be planted to Egyptian cotton should be put into good tilth not later than early in March, so that the seed may be planted as soon as the ground is warm enough to permit it to germinate quickly and grow rapidly from the start. At Sacaton and Yuma, Ariz., the best results have come from planting during the last week in March and the first week in April, though fair crops have been made when planting was done as late as the first week in May. Whether the seed is put in on level land or on ridges will depend on local conditions. If the land takes water well enough to be irrigated by furrows, ridge planting may give good results, but if the soil is hard and takes water slowly the crop should be planted on the level. Good crops have been raised by both methods.

The preliminary irrigation should be timed so that the surface soil may be put into a fine tilth just ahead of the planter. The planting must follow the irrigation, while there is still enough moisture in the soil to germinate the seed promptly and evenly. If the soil should get too dry before the cotton can be planted, it is better to delay planting until after the next irrigation instead of being obliged to irrigate immediately after planting in order to germinate the seed. The young plants are often unable to push through the crust that forms after the land is irrigated.

PLANTING.

The seed may be planted with either a one-row or a two-row drill planter of the type used for both corn and cotton. It is important that the press wheel of the planter should have an open rim so that the soil will be packed on each side of the seed rather than immediately above it. The planter should be set to drop the seed into moist soil, but not more than 2 inches deep. It is of the greatest importance to get the seed planted right in order that it may all come up at once so that thinning and later cultivation can follow in regular course. The planter should drop the seed not over 2 inches apart in the row, and the rows may be from 4 to 5 feet apart. Planting at this rate will require approximately 20 pounds of seed per acre. In very heavy soils it will be well to plant the seed rather thicker in the row to insure a uniform stand.

CULTURAL REQUIREMENTS.

If conditions are favorable the cotton should be well above the ground two weeks after planting. As soon as the plants are up far enough to show the rows the ground should be thoroughly cultivated to break any surface crust that may have formed and to check evaporation. This early cultivation is very important, because it

helps the young plants to get well established and reach a good height before the first irrigation is needed. The first irrigation after the planting should be postponed as long as possible, often six or eight weeks after the seed is put in. While young the plants do not require much water and will develop better roots if water is kept off and the surface soil is kept in good tilth.

THINNING OR CHOPPING.

The thinning of Egyptian cotton is one of the operations that should be attended to with the greatest care and judgment, because it has a direct bearing on the productiveness of the mature plants. Careful observation on the part of the grower must in the end be his safest guide as to how to manage the thinning. The object is not only to secure the largest possible production of cotton per acre but to facilitate picking. To this end the first thing is to get a good stand, hence the emphasis given in this publication to the preparation of the land and the careful planting.

Starting with a thick and uniform stand, there is reason to believe that the best results will be attained by gradual thinning. If the crop is thinned out when very young to the stand that is desirable when they are full grown, the limbs near the base of the plant are likely to become very large and to break down later and lie sprawling between the rows, thus making cultivation and picking difficult and expensive. On the other hand, if two or three successive thinnings are practiced so that the plants are not too widely separated, the limbs will remain smaller and most of the bolls will be borne by the upright main stalks.

When the crop is produced on a large scale it will, of course, be impracticable to go over the field many times, but it will prove well worth while to make at least two jobs of the thinning rather than to do it all at once. The best suggestion that can be offered at present is to do the first thinning when the plants are about 6 inches high and have about 6 leaves to the plant. At that time the work should be done with a narrow hoe, so as to leave the plants standing about 6 inches apart in the row. About two weeks later, when they have reached a height of 10 to 12 inches, they should be thinned again. At that time two out of every three plants should be cut out if the stand is perfect and the growth vigorous, thus leaving the plants to mature at a distance apart of about 18 inches.

IRRIGATION.

For successful cotton production in the Southwest good judgment must be used in both irrigating and cultivating the crop. It would be a great mistake to try to make either process take the place of

the other. When the cotton plant is young and small its water requirements are not great. As it increases in size the daily water requirement also increases, because of the increased leaf surface and the greater transpiration in hot weather. If the soil contains a good supply of moisture when the crop is planted, and if the surface is kept well cultivated to prevent its drying out, the young plants will send their roots deep and obtain all the water they need. As the plants increase in size and approach their full development their water requirement increases, so that the water supplied by each irrigation is more rapidly exhausted.

While the frequency of irrigation that will give the best results differs greatly in different sections, it is probable that two irrigations between the date of planting and the 1st of July will generally be found adequate. After the 1st of July in most soils the crop should be irrigated every 12 to 15 days until the cool weather of September. At that time the crop is well set and the bolls are beginning to open. In some localities more frequent irrigations may be found necessary if the plants wilt badly in the middle of the day.

CULTIVATION.

Frequent cultivation is absolutely essential. The crop should be cultivated as soon as the plants are up and as often as may be necessary to maintain a loose mulch on the soil surface. It is particularly important to cultivate after each irrigation as soon as the soil is dry enough. Cultivation should be continued as long as it is possible to get through between the rows with a horse and a cultivator, or until about the 1st of August. A reason for this intensive cultivation exists quite aside from that of saving irrigation water. If a cotton plant on which flowers are opening and bolls are setting is subjected to sudden extreme fluctuations of soil moisture the bolls can not develop properly and a full crop can not be obtained. Moreover, the bolls will open prematurely and the quality of the fiber will be seriously impaired. This checking of development can be avoided if the crop is watered whenever the plants show signs of suffering from lack of moisture, and if cultivation after each irrigation is prompt and effective. By the time the plants have become too large for cultivation they shade the ground and thus check evaporation.

PICKING.

In order to be marketable as high-grade fiber, Egyptian cotton must be picked without trash or dirt. Short-staple Upland cotton is often picked and sent to the gin carrying much trash in the form of pieces of leaves and bracts. In the case of short cotton much of this trash can be taken out at the gin, and the remainder is removed in the initial processes of manufacture. With Egyptian cotton the case is

different. This type of cotton must be ginned on a roller gin, which does not eliminate any of the trash, but on the contrary merely breaks it into smaller pieces and distributes it through the lint. The factories where the better grades of Egyptian cotton are used are not equipped for removing this trash, because the cotton imported from Egypt is picked clean and kept clean. Furthermore, the treatment necessary to free the lint from trash would be so severe as to injure the fiber and make it practically useless for high-grade yarn and thread. This being the case, prospective growers of Egyptian cotton in the Southwest should definitely understand that they must send to the gin only clean seed cotton.

The Pima Indian women in the vicinity of Sacaton have shown their ability to pick Egyptian cotton so that the seed cotton is practically free from trash. These women, working rather less than eight hours a day, have picked on an average about 50 pounds of seed cotton per day, while some of the more industrious and experienced have picked 70 pounds a day.

From these figures it is evident that picking is by far the most expensive item in the production of Egyptian cotton. With labor conditions as they are at present in the Southwest it will probably cost from \$2 to \$2.50 per hundred pounds of seed cotton to harvest the crop when the work is done entirely by hired labor.

The picking season begins about the middle of September and lasts until about two weeks after the first killing frost, which is often well into December. This season is the most pleasant part of the year in the Southwest, so that picking is done under very favorable climatic conditions. If the yield is such as may be expected under proper conditions of soil and management, i. e., from 1,500 to 2,000 pounds of seed cotton per acre, it is estimated that the entire time of one good picker during a season of 80 to 90 days will be required to harvest the crop from 2 acres.

The Pima Indian women who have done the best and cleanest picking do not use a large sack, such as is used in picking Upland cotton. Instead, they carry a very small bag or a modified apron, which is fastened around the waist and has only a small opening; consequently, no trash is caught in the bag as they work their way among the plants. Where they are picking short rows the bag is emptied from time to time on a blanket or canvas at the end of the row or into a larger sack. Where the rows are long a larger sack is carried along the nearest border and used for collecting the contents of the small bags.

GINNING AND BALING.

Egyptian cotton should be ginned without cutting or injuring the fiber. Roller gins are used exclusively in Egypt and in the Sea Island district, also to some extent for ginning long-staple Upland cottons.

Roller gins do not work as rapidly as saw gins, and consequently the cost of ginning Egyptian cotton will probably exceed the current prices for ginning Upland cotton. In communities where a number of people desire to grow Egyptian cotton it will no doubt be found desirable to organize a cotton-growing association, which may undertake the equipment of an adequate plant for ginning and baling the crop.

In view of the long freight haul to eastern markets it will be desirable to reduce the bulk of the bales as much as possible by hydraulic compressing in order to get a low freight rate. It will also be desirable to cover the bales with material of a better grade than is used on bales of Upland cotton. The cotton will reach the eastern market in a much better condition and will command a better price if the bales are completely covered with a grade of burlap, such as is used for wool sacks in the Southwest.

Until the market for American-grown Egyptian cotton is definitely organized it will be necessary to sell the crop on sample. These samples should be made up as the cotton is being baled at the ginning plant, so that it will not be necessary to tear the bales open afterwards to get out the samples.

SEED SELECTION.

The high quality of the Egyptian cotton that has been grown in the Southwest is due to careful selection. This high standard of quality can not be maintained unless selection is continued year after year, as has long been the practice in the Sea Island district of South Carolina and Georgia.

It should not be expected that one can plant year after year the seed from unselected fields as it comes from the gins and maintain the yield and quality of the fiber. It should therefore be the function of each community to make some provision for securing each year a select stock of seed. This had best be grown in each locality by individuals who are willing to give the matter the necessary attention and whose fields are so situated that there will be no danger of crossing by other types of cotton, particularly by Upland cotton.

Another function of this "community cotton growers' association" should be to discourage the growing of Upland cotton in a locality where Egyptian cotton is produced. The irrigated sections of the Southwest are not too large for community action in this matter, and their isolation from each other will make community action easy and effective. None of these irrigated districts are large enough to justify the attempt to produce both Egyptian and Upland cotton on a commercial scale. Hence, each community should decide in advance which kind of cotton it will undertake to produce, or else should completely abandon the culture of one kind before undertaking the other.

The reasons for these recommendations are, briefly:

(1) The two kinds of cotton, if grown in the same neighborhood, will interbreed, and hybrid seed will result. Such seed can not be planted with the expectation of marketing the product as Egyptian cotton, uniformity being indispensable in that type.

(2) The two classes of cotton require different ginning machinery, and to avoid mixture at the gins separate plants would be required for handling each.

(3) The labor trained to pick one class of cotton can not be used to advantage in picking the other class.

(4) The market standards, customs, and requirements for the two classes of cotton are so different that constant confusion would result from an attempt to deal commercially with both classes in the same community.

ADVANTAGES OF COOPERATIVE EFFORT.

Community effort will be necessary in order to establish Egyptian cotton as a commercial crop in the Southwest. It ought not to be difficult in that section to form cooperative associations, since the irrigated districts are more or less isolated and since associations of water users already exist in most of them.

Some of the principal functions which should be undertaken by such a cooperative association of Egyptian cotton growers have already been mentioned, but it is thought well to summarize them here, as follows:

(1) To arrange for the planting of a sufficient acreage so that favorable terms may be secured in shipping and marketing the product.

(2) To provide the necessary machinery for ginning and baling the fiber and, possibly, at the outset to obtain some of the special cultural implements required.

(3) To maintain a supply of pure-bred seed for planting each year.

(4) To guard against bringing into the district Upland and other types of cotton which might interbreed with Egyptian and diminish the value of the product.

(5) To cooperate with State and local officials in enforcing quarantine regulations for keeping out the boll weevil and other injurious insects and diseases.

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